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Amelioration of mitochondrial dysfunction and hippocampal neuronal death by Apigenin in an Alzheimer's disease model

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Background & Purpose: Apigenin, a non-toxic and non-mutagenic flavone, has the potential of free radical scavenging activity. Recent studies revealed the protective effect of apigenin against A β neurotoxicity but the underlying mechanism was unclear. The purpose of this study was to reveal the protective effect of apigenin against A β 25-35 by inhibition of mitochondrial caspase 9 and cytochrome C release. The ability of apigenin to prevent dynamin-related protein (Drp1) activation and thereby protection against mitochondrial fragmentation and dysfunction was the second goal of this study.

Methods: A β 25-35 was microinjected into the left lateral cerebral ventricle. Oral administration of apigenin was started half an hour before the surgery and continued for the following 21 days. After three weeks, the animals were sacrificed and their brains were removed for further histological and molecular processes. Cell death and neurodegeneration was assessed by Nissl and Fluoro Jade B staining in CA1 area of the hippocampus. Cytochrome C and caspase 9 was detected by immunohistochemistry in the same area and Drp1 was detected by western blotting.

Results: The results revealed that oral administration of apigenin protected CA1 neurons from A β toxicity ($P < 0.001$ for Nissl and Fluoro Jade B). The protection was associated with a significant decrease in mitochondrial caspase 9 and Cytochrome C release ($P < 0.01$). Drp1 was also significantly decreased in apigenin treated groups ($P < 0.01$).

Conclusion: These data demonstrate that the flavone apigenin protects highly vulnerable CA1 neurons against A β toxicity and suggest that it is mediated by amelioration in mitochondrial dysfunction.

Biography

Farnaz Nikbakht was born in Tehran, Iran, on 8 October 1969. Before obtaining her Ph.D. degree in Human Physiology from Shiraz University in 2007, she received an award from the Iran Ministry of Health and Education and spent six months at Flinders University, Adelaide, Australia for completing her research on degenerative diseases. Now, as the Associate professor of Department of Physiology, in Iran University of Medical Sciences, she has managed several research programs and has conducted the thesis of several Masters and Ph.D. students in her Lab. Since 2010 she has directed a research team on Epilepsy and Alzheimer's diseases fields in her lab. Her research leads to publishing several articles.

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